

## ABSTRACT

A method is described for selectively etching a high k dielectric layer that is preferably a hafnium or zirconium oxide, silicate, nitride, or oxynitride with a selectivity of greater than 2:1 relative to silicon oxide, polysilicon, or silicon. The plasma etch chemistry is comprised of one or more halogen containing gases such as  $\text{CF}_4$ ,  $\text{CHF}_3$ ,  $\text{CH}_2\text{F}_2$ ,  $\text{CH}_3\text{F}$ ,  $\text{C}_4\text{F}_8$ ,  $\text{C}_4\text{F}_6$ ,  $\text{C}_5\text{F}_6$ ,  $\text{BCl}_3$ ,  $\text{Br}_2$ ,  $\text{HF}$ ,  $\text{HCl}$ ,  $\text{HBr}$ ,  $\text{HI}$ , and  $\text{NF}_3$  and leaves no etch residues. An inert gas or an inert gas and oxidant gas may be added to the halogen containing gas. In one embodiment, a high k gate dielectric layer is removed on portions of an active area in a MOS transistor. Alternatively, the high k dielectric layer is used in a capacitor between two conducting layers and is selectively removed from portions of an ILD layer.